

Geospatial Engineering: Combat Development Update

By Mr. Kenneth Bergman

This article provides an update on emerging changes in geospatial engineering and battle command that better enable current and future warfighters in situational understanding and decisionmaking. To this end, the United States Army Training and Doctrine Command (TRADOC) Capability Manager–Geospatial (TCM–Geospatial) completed the Army Geospatial Enterprise functional solutions analysis (FSA) in August 2007. Since then, the TCM–Geospatial and the United States Army Maneuver Support Center (MANSCEN), Fort Leonard Wood, Missouri, have been working with the Army Staff and the United States Army Geospatial Center (AGC) (formerly the Topographic Engineering Center) to implement recommended solutions.

The geospatial enterprise FSA addresses a number of initiatives, one of which deals with organizational changes at the Department of the Army (DA) level to achieve governance across the Army. While the Chief of Engineers continues to serve as the Topographer of the Army, the Director of the AGC has been designated as the Deputy Topographer of the Army and the Army's Geospatial Information Officer (GIO). Mr. Robert Burkhardt, as the AGC Director and GIO, reports directly to the Chief of Engineers on geospatial matters. Mr. Burkhardt has initiated policies to standardize the use of geospatial capabilities in battle command systems. The Geospatial Acquisition Support Directorate (GASD) is a new organization established under the AGC that works across programs of record to establish interoperable geospatial software tools and products based on common standards and interfaces. A new Geospatial Governance Board was established at DA to provide oversight and guidance at the general officer level.

To support these top-level changes, the geospatial engineers are working at all echelons to establish a new concept called the Army Geospatial Enterprise (AGE),¹ where all Soldiers in the field can use various geospatial products and discover and enter geospatial data in an enterprise (distributed) environment. The AGE concept embodies the Army tenet that "every Soldier is a sensor." Soldiers on the ground provide the most accurate input on conditions that update the map foundation for the common operating picture (COP). Geospatial engineer teams will increasingly serve as clearinghouses for data flowing from convoys or patrols, helicopter pilots returning from missions, Soldiers with handheld devices, and other field sources.

The AGE is technically feasible in commercial software, but it has not yet been implemented across systems in the

field. Geospatial data handling and management in battle command is currently a disjointed collection of processes and products resulting in multiple pictures with no unified COP.² This can be overcome by integrating standardized geographic information system (GIS) technologies across the Army's battle command systems. A GIS uses digital automated tools to manage, edit, and enhance geospatial information to support decisionmaking processes. A GIS can be used to represent the foundational geospatial layers depicted in Figure 1, page 47. Situational awareness information is depicted in the top layer of the figure, in conjunction with the geospatial foundation.

There is increasing recognition of the need for current, accurate GIS capabilities that form the foundation of the COP. This need is being met by organizational and technological changes that will accelerate the insertion of integrated solutions across all Army functional areas. These changes will ensure that our Soldiers receive enhanced geospatial capabilities in their battle command systems.

Under the GIO's direction, the GASD is leading efforts to standardize formats and types of geospatial products that are used in battle command systems. GIS standardization includes the establishment of an Army Geospatial Data Model. The GASD has already established an initial version of a geospatial data model that closely aligns with the National Geospatial–Intelligence Agency (NGA), as well as geospatial standards used by international and commercial communities. Modeling and simulation concepts are also being integrated into the Army Geospatial Data Model. Ongoing model development will lead to a common and interchangeable COP foundation that is built on data models and standards compatible within the Department of Defense (DOD) and with coalition partners.

GASD continues to promote the use of Commercial Joint Mapping Toolkit, where appropriate, across battle command and acquisition community programs of record. NGA oversees the development of the toolkit, including terrain-reasoning software that the AGC has developed. Warfighters have used sand tables for decades to analyze terrain and convey knowledge to others. Today's systems go several steps further by using tools that automate the modified combined obstacle overlay (MCOO). Emerging capabilities from the Battlespace Terrain Reasoning and Awareness program, led by the AGC, will enable Soldiers to use dynamic MCOO-related applications embedded in battle command systems to provide

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE APR 2009		2. REPORT TYPE		3. DATES COVERED 00-00-2009 to 00-00-2009	
4. TITLE AND SUBTITLE Geospatial Engineering: Combat Development Update				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer School,14010 MSCoE Loop BLDG 3201, Suite 2661,Fort Leonard Wood,MO,65473-8702				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 3	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

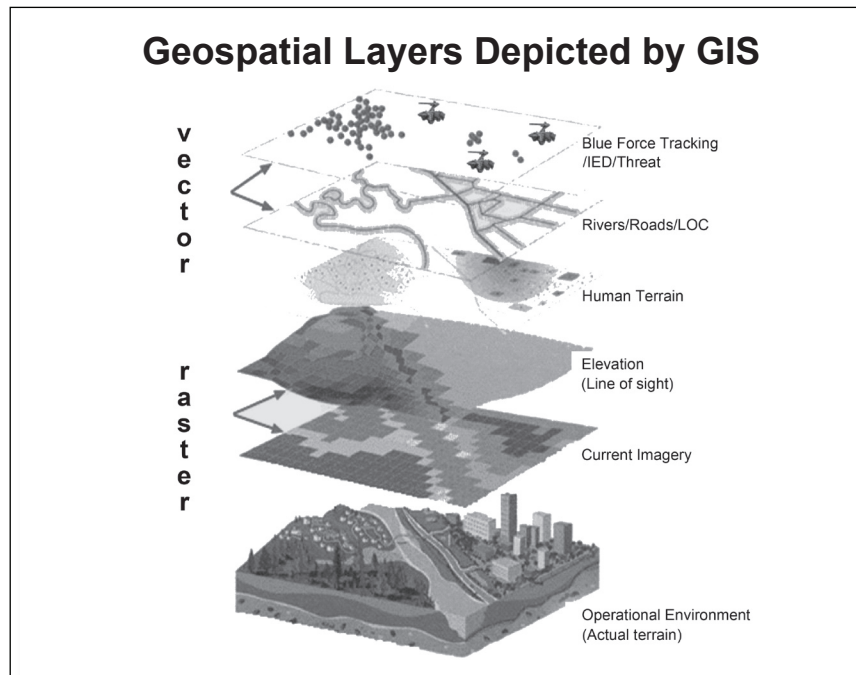


Figure 1

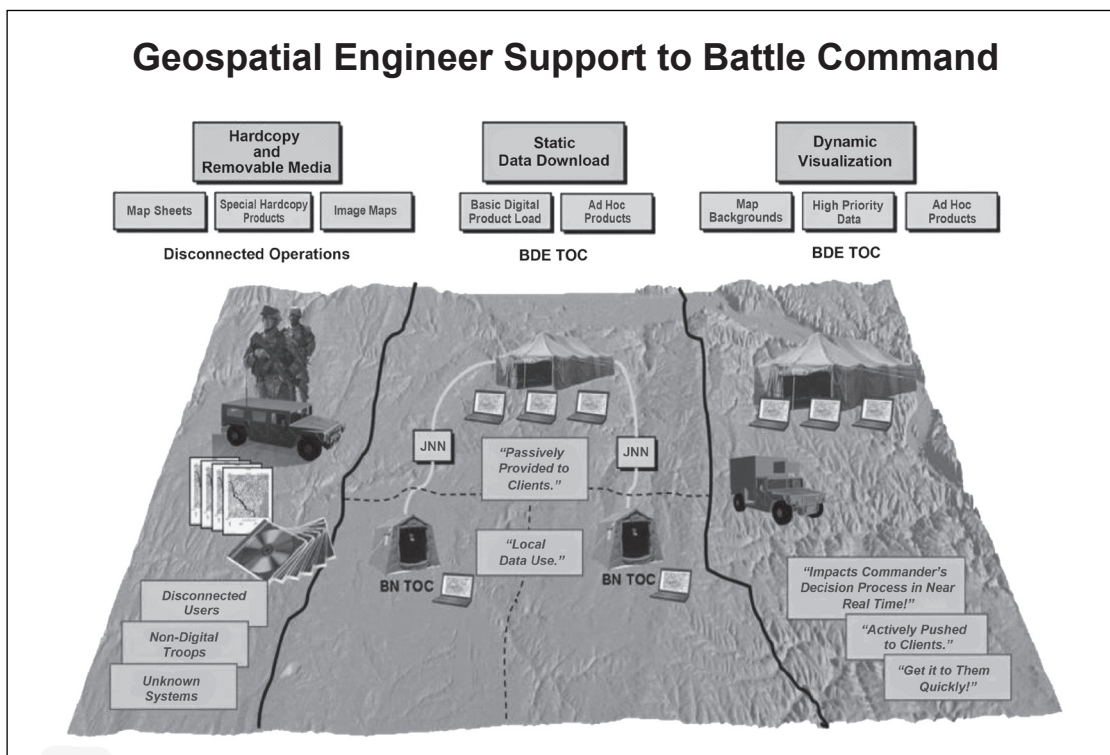



Figure 2

route analysis, line-of-sight analysis, and many other tools. Soldiers at the last tactical mile will be able to tap into terrain-reasoning capabilities at the platform level.

While all of these changes are taking place in battle command system development, the systems used by the geospatial engineer teams are changing as well. Geospatial engineers have used the Digital Topographic Support System (DTSS) for many years to support the military

decisionmaking process. DTSS is migrating as the geospatial component of the Distributed Common Ground Station–Army to support integrated intelligence, surveillance, and reconnaissance capabilities. Figure 2 shows the various ways the geospatial engineer teams support battle command.³

Knowledge and understanding of geospatial capabilities are essential to providing our forces with the information advantages they need, especially in complex and urban terrain.

After eight years of engagement in the War on Terrorism, we currently have unprecedented levels of detailed geospatial data, but many Soldiers are simply unaware of these capabilities. As we continue to advance the geospatial capabilities used in battle command, it is essential that Soldiers receive the training they need to understand the operational environment. Training all Army leaders is critical in properly equipping our Soldiers for deployments. MANSCEN is conducting a training needs assessment to produce an overall training strategy to adjust professional military education so all Soldiers can better leverage geospatial capabilities. Decisions regarding geospatial engineering combat development will continue to have a significant impact on the Army, DOD, and coalition partners. These geospatial initiatives are changing the way we operate in the Engineer Regiment and across all Army functional areas. As we advance the state of the art in geospatial engineering, we maximize the informational advantage for all warfighters in successful mission execution. 

Mr. Bergman is a member of the Corps of Engineers Army Geospatial Center (AGC). He is assigned to Fort Leonard Wood, Missouri, to provide direct support to TCM–Geospatial. A former United States Marine, he is a Naval Academy graduate and holds a master’s in systems engineering from George Mason University.

Endnotes

¹The Army Geospatial Enterprise (AGE) comprises the people, organizations, and technology involved in acquiring and managing geospatial data that affects all Army missions. Army battle command, consisting of operations, intelligence, mission rehearsal, and training capabilities, all depend on achieving an AGE. At its core, the AGE is a distributed database and supporting infrastructure that is based on a common suite of interoperable software. The AGE allows geospatial data to be collected, stored, fused, analyzed, and disseminated horizontally and vertically (from peer-to-peer and from echelon to echelon, down to the individual Soldier).

²Major David P. Burris, “White Paper on Geospatial Support to Battle Command,” TCM–Geospatial, Maneuver Support Center, Fort Leonard Wood, Missouri, 9 January 2008.

³Figure from http://www.tec.army.mil/ctis/software/geospatial_services/index.html.

